

CLAIMS

1. A system for providing service level management in a network, wherein a service is composed of network components and a state of the service depends on the state of the network components, the system comprising:

multiple monitoring agents to each monitor a respective aspect of operation of the network, each monitoring agent to detect one or more events relative to the respective aspect of operation and to generate an alarm as a function of the one or more detected events; and

an alarm correlation agent to receive the one or more alarms from the monitoring agents to determine a state of a service and, if necessary, to issue one or more instructions to establish a desired state of the service.

2. The system of claim 1, wherein the monitoring agents comprise at least one of: an infrastructure monitoring agent to monitor operation of the network infrastructure;

a computer system monitoring agent to monitor operation of at least one computer system on the network;

a network traffic monitoring agent to monitor traffic on the network;

an application monitoring agent to monitor operation of at least one application operating on the network;

a trouble-ticketing agent to receive reports of problems by users with respect to operation of the network;

a response time monitoring agent to monitor a response time of a communication on the network;

a device monitoring agent to monitor operation of a device on the network; and

a multicomponent monitoring agent comprising an aggregate of any of the above monitoring agents.

3. The system of claim 1, wherein the monitoring agents and alarm correlation agents comprise reasoning agents.

4. The system of claim 3, wherein the reasoning agents comprise one or more of:
a rule-based reasoning agent;
a model-based reasoning agent;
a state-transition graph based reasoning agent;
5 a code book based reasoning agent; and
a case-based reasoning agent.

5. The system of claim 1, comprising:
an alarm repository to receive the one or more alarms from the monitoring
10 agents,
wherein the alarm correlation agent reads the alarms in the alarm repository.

6. A system for providing service level management in a network, wherein a
service is composed of network components and a state of the service depends on a state of
15 the network components, the system comprising:
a first monitoring agent to monitor a respective first aspect of operation of the
network, the first monitoring agent to detect one or more events relative to the first
aspect of operation and to generate an alarm as a function of the one or more detected
events;
20 a second monitoring agent to monitor a respective second aspect of operation
of the network, different from the first aspect, the second monitoring agent to detect
one or more events relative to the second aspect of operation and to generate an alarm
as a function of the one or more detected events; and
an alarm repository to receive one or more alarms from each of the first and
25 second monitoring agents.

7. The system of claim 6, comprising:
an alarm correlation agent to read the one or more alarms in the alarm
repository, and to determine a state of a service from the read one or more alarms.

8. The system of claim 7, wherein the alarm correlation agent is operative to issue
one or more instructions to establish a desired state of the service.

9. The system of claim 6, wherein the first and second monitoring agents comprise one or more of:

an infrastructure monitoring agent to monitor operation of the network infrastructure;

5 a computer system monitoring agent to monitor operation of at least one computer system on the network;

a network traffic monitoring agent to monitor traffic on the network;

an application monitoring agent to monitor operation of at least one application operating on the network;

10 a trouble-ticketing agent to receive reports of problems by users with respect to operation of the network

a response time monitoring agent to monitor a response time of a communication on the network;

a device monitoring agent to monitor operation of a device on the network; and

15 a multicomponent monitoring agent comprising an aggregate of any of the above monitoring agents.

10. The system of claim 7, wherein the first and second monitoring agents and the alarm correlation agent comprise one or more of:

20 a rule-based reasoning agent;

a model-based reasoning agent;

a state-transition graph based reasoning agent;

a code book based reasoning agent; and

25 a case-based reasoning agent.

11. A system for providing service level management in a network having at least one monitoring agent to monitor at least one aspect of operation and to generate an alarm as a function of one or more detected events, wherein a service is composed of network components and a state of the service depends on the state of the network components, the
30 system comprising:

an alarm correlation agent to receive the one or more alarms from the at least one monitoring agent to determine a state of a service and, if necessary, to issue one or more instructions to establish a desired state of the service.

12. The system of claim 11, wherein the alarm correlation agent comprises one or more of:

- a rule-based reasoning agent;
- a model-based reasoning agent;
- a state-transition graph based reasoning agent;
- a code book reasoning agent; and
- a case-based reasoning agent.

13. A method of providing service level management in a network, wherein a service is composed of network components and a state of the service depends on the state of the network components, the method comprising:

- monitoring one or more aspects of operation of the network and detecting one or more events relative to of the one or more aspects of operation;
- generating an alarm for a respective aspect of network operation as a function of the respective detected one or more events; and
- correlating the one or more alarms and determining a state of the service as a function of the correlated alarms.

14. The method of claim 13, further comprising:
generating one or more instructions to establish a desired state of the service.

15. The method according to claim 13, further comprising monitoring at least one of:

- operation of the network infrastructure;
- operation of at least one computer system on the network;
- traffic on the network;
- operation of at least one application operating on the network; and
- operation of a trouble-ticketing process that receives reports of problems by users with respect to operation of the network;
- operation of a device on the network;
- response time of a communication on the network;
- an aggregate of any of the above.

16. The method of claim 13, wherein the generating an alarm comprises applying at least one of:

rule-based reasoning;
model-based reasoning;
state-transition graph based reasoning;
codebooks based reasoning; and
case-based reasoning.

17. The method of claim 13, wherein correlating the one or more alarms comprises applying at least one of:

rule-based reasoning;
model-based reasoning;
state-transition graph based reasoning;
codebooks based reasoning ; and
case-based reasoning.

18. A method of providing service level management in a network, wherein a service is composed of network components and a state of the service depends on a state of the network components, the method comprising:

monitoring a first aspect of operation of the network and detecting one or more events relative to the first aspect of network operation;

monitoring a second aspect of operation of the network, different from the first aspect, and detecting one or more events relative to the second aspect of network operation;

generating a first alarm as a function of the detected one or more events relative to the first aspect of network operation;

generating a second alarm as a function of the detected one or more events relative to the second aspect of network operation; and

sending the first and second alarms to an alarm repository.

19. The method of claim 18, comprising:

accessing the first and second alarms from the alarm repository; and

determining a state of a service as a function of the accessed first and second alarms.

20. The method of claim 19, comprising:

5 generating one or more instructions to establish a desired state of the service, wherein the one or more instructions control an operation of the network.

21. A computer program product comprising:

a computer readable medium;

10 computer program instructions on the computer-readable medium, wherein the computer program instructions, when executed by a computer, directs the computer to perform a method of providing service level management in a network, wherein a service is composed of network components and a state of the service depends on a state of the network components, the method comprising:

15 monitoring one or more aspects of operation of the network and detecting one or more events relative to the one or more aspects of operation;

generating an alarm for a respective aspect of network operation as a function of the respective detected one or more events; and

20 correlating the one or more alarms and determining a state of a service as a function of the correlated alarms.

22. A system for providing service level management in a network, wherein a service is composed of network components and a state of the service depends on a state of the network components, the system comprising:

25 means for monitoring one or more aspects of operation of the network and detecting one or more events relative to the one or more aspects of network operation;

means for generating an alarm for a respective aspect of network operation as a function of the respective detected one or more events; and

30 means for correlating the one or more alarms and determining a state of the service as a function of the correlated alarms.

23. A system for providing service level management in the network, wherein a service is composed of network components and a state of the service depends on the state of the network components, the system comprising:

multiple monitoring agents to each monitor a respective aspect of operation of the network, each monitoring agent to detect one or more events relative to the respective aspect of operation and generate an alarm as a function of the one or more detected events; and

each monitoring agent including an alarm correlation agent to receive one or more alarms from the other monitoring agents for consideration in the step of generating the alarm as a function of the one or more detected events; and

each monitoring agent including a control agent to issue one or more instructions regarding the respective aspect of operation of the network in order to establish a desired state of a service.

24. The system of claim 23, wherein the monitoring agents comprise at least one of:

an infrastructure monitoring agent to monitor operation of the network infrastructure;

a computer system monitoring agent to monitor operation of at least one computer system on the network;

a network traffic monitoring agent to monitor traffic on the network;

an application monitoring agent to monitor operation of at least one application operating on the network;

a trouble-ticketing agent to receive reports of problems by users with respect to operation of the network;

a response time monitoring agent to monitor a response time of a communication on the network;

a device monitoring agent to monitor operation of a device on the network; and

a multicomponent monitoring agent comprising an aggregate of any of the above monitoring agents.

25. The system of claim 23, wherein the monitoring agents comprise at least one of:

- a rule-based reasoning agent;
- a model-based reasoning agent;
- 5 a state-transition graph based reasoning agent;
- a code book based reasoning agent; and
- a case-based reasoning agent.

26. A computer program product comprising:

10 a computer readable medium;

computer program instructions on the computer readable medium, wherein the computer program instructions, when executed by a computer, direct the computer to perform a method of providing service level management in a network, wherein a service is composed of network components and a state of the service depends on a state of the network components, the method comprising, for each of a plurality of agents:

15 monitoring one or more aspects of the respective operation of the network and detecting the one or more events relative to the respective one or more aspects of operation;

20 generating an alarm for the respective aspect of network operation as a function of the respective detected one or more events; and

communicating with the other agents to access events or alarms in the respective operation of the other monitoring agent, and correlating these events or alarms from other monitoring agents in the alarm generated for the respective aspect of network operation.

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